

# Mission Imfromageable

Habitat layout creator

By Wallace & Gromit

*"Everybody knows the moon is made of cheese..."*





# HABITAT LAYOUT DESIGNER

Design, validate, and optimize a mission-ready habitat faster than launch prep.

DESIGNER

CROSS-SECTION VIEW

DESIGN LIBRARY

1 Frame your habitat shell

2 Drop in mission-critical modules

3 Simulate & optimize to validate coverage

## Mission Blueprint

Define number of crew

Set crew context and pick a rendering style before shaping the shell.

Crew Size

4

Mission Focus

List mission priorities to guarantee critical coverage.

STYLE

Realistic

HABITAT

MODULE

Shape

Cube

Width

10

Depth

20

Height

10

Define overall shape and dimensions of the habitat boundary.

Hit update to visualize within Snapshot and layout map

UPDATE HABITAT

Provide any mission specific critical functions (e.g. treadmill, work bench etc) critical to specific mission

## Snapshot

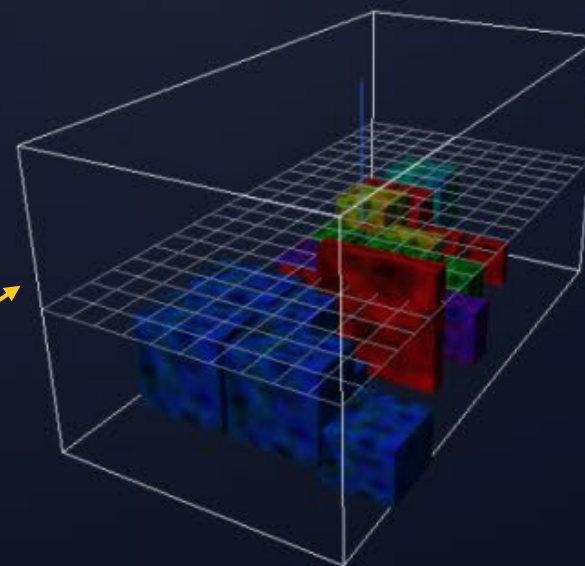
Watch the 3D render refresh after each optimization cycle.

SIMULATE

OPTIMIZE

Manual simulate button

Manual optimize button (re-arrange each module to not overlap). If modules don't fit, a pop-up window shows a list to approve removal



Module Library

ENSURE CRITICAL MODULES



NEED MODULE IDEAS?



## Module Library

Drop prefabs directly into your layout or tweak them on the right.

Pre-defined module based on “Defining the Required Net Habitable Volume for Long Duration Exploration Missions” functions with minimum volume or width/depth/height

### EVA SUIT DON/DOFFING

AIRLOCK x1

Critical requirement: Airlock – EVA Suit Don/Doffing

1.66 × 1.66 × 2.31 m z 1.16 m

ADD TO LAYOUT

### SUIT SERVICING

AIRLOCK x1

Critical requirement: Airlock – Suit servicing

1.18 × 2.05 × 2 m z 1 m

ADD TO LAYOUT

### COMPUTER DISPLAY AND CONTROL INTERFACE

EVA SUPPORT x1

Critical requirement: EVA Support – Computer Display and Control Interface

0.65 × 1.62 × 1.62 m z 0.81 m

ADD TO LAYOUT

### SUIT COMPONENT TESTING

EVA SUPPORT x1

Critical requirement: EVA Support – Suit Component Testing

1.44 × 1.44 × 2.31 m z 1.16 m

ADD TO LAYOUT

### AEROBIC EXERCISE (CYCLE ERGOMETER)

EXERCISE x1

Critical requirement: Exercise – Aerobic Exercise (cycle ergometer)

0.65 × 0.69 × 7.54 m z 3.77 m

ADD TO LAYOUT

### AEROBIC EXERCISE (TREADMILL)

EXERCISE x1

Critical requirement: Exercise – Aerobic Exercise (treadmill)

1.79 × 1.79 × 1.91 m z 0.95 m

ADD TO LAYOUT

### RESISTIVE EXERCISE

EXERCISE x1

Critical requirement: Exercise – Resistive Exercise

1.43 × 1.43 × 1.91 m z 0.95 m

ADD TO LAYOUT

### ATHLETIC GAMES

GROUP  
SOCIALIZATION  
& RECREATION x1

Critical requirement: Group Socialization & Recreation – Athletic Games

3.06 × 1.95 × 3.06 m z 1.53 m

ADD TO LAYOUT

### TABLETOP GAMES & ARTISTIC/CREATIVE RECREATION

GROUP  
SOCIALIZATION  
& RECREATION

Critical requirement: Group Socialization & Recreation – Tabletop games & artistic/creative recreation

2.35 × 2.35 × 1.83 m z 0.92 m

ADD TO LAYOUT

### COMMAND AND CONTROL

HABITAT  
MONITORING AND  
COMMANDING x1

Critical requirement: Habitat Monitoring and Commanding – Command and Control

1.34 × 1.34 × 1.91 m z 0.95 m

ADD TO LAYOUT

### HAND CLEANING

HUMAN WASTE  
COLLECTION x1

Critical requirement: Human Waste Collection – Hand cleaning

0.65 × 0.54 × 7.66 m z 3.83 m

ADD TO LAYOUT

### SOLID WASTE COLLECTION

HUMAN WASTE  
COLLECTION x1

Critical requirement: Human Waste Collection – Solid waste collection

0.65 × 2.44 × 1.49 m z 0.74 m

ADD TO LAYOUT

### CLEANSING WORK SPACE

HYGIENE x1

Critical requirement: Hygiene –

### SKIN CARE

HYGIENE x1

Critical requirement: Hygiene – Skin care

### PHYSICAL WORK SURFACE ACCESS

LOGISTICS x1

Critical requirement: Logistics –

### TEMPORARY STOWAGE

LOGISTICS x1

Critical requirement: Logistics –

ENSURE CRITICAL MODULES

Search prefabs...

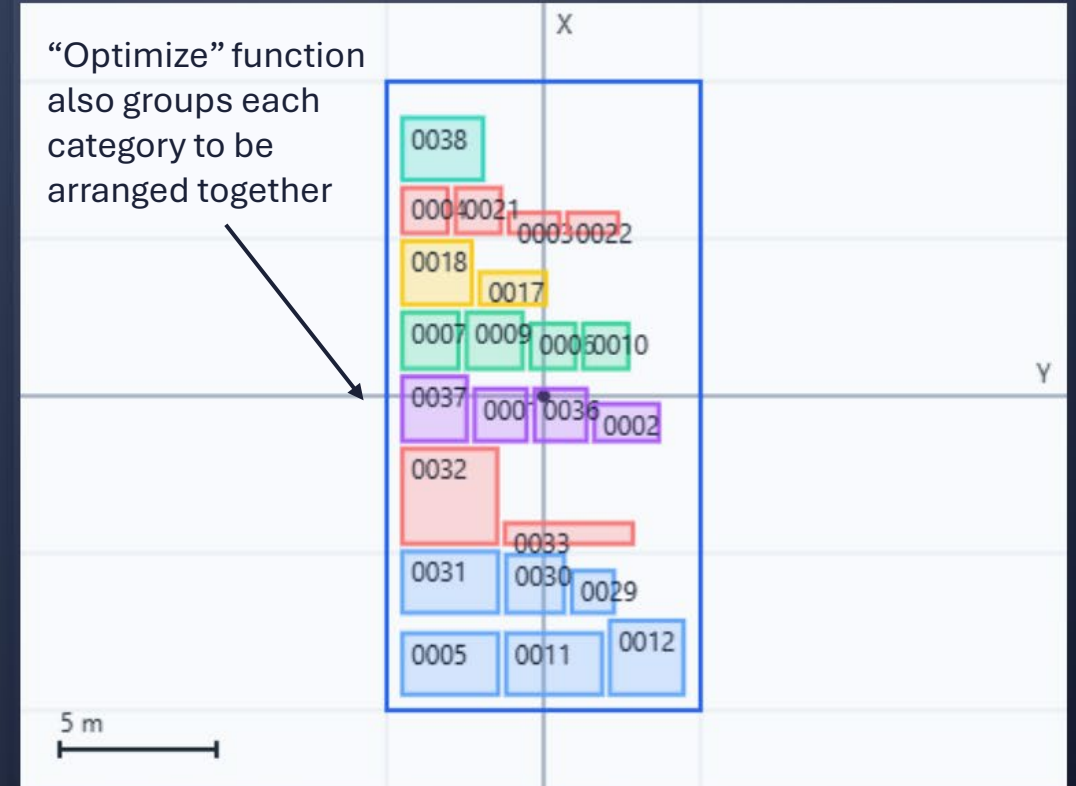
Each pre-defined module has criticality rating. This button adds all criticality “1” modules to the habitat. Each addition to layout triggers “Simulate” and “Optimize” function

The optimizer clusters modules by type, keeps critical functions, and flags removals inline.

## Layout Map

2D Birds-eye view

“Optimize” function also groups each category to be arranged together



NEED MODULE IDEAS?

ADD TO LAYOUT

ADD TO LAYOUT

HYGIENE

1.51 x 1.51 x 1.91 m z 0.95 m

**ADD TO LAYOUT**

HYGIENE

1.54 × 0.98 × 1.54 m z 0.77 m

ADD TO LAYOUT

LOGISTICS

## Bar chart to a

LOGISTICS

## References

## Volumetric comparison between the habitat vs space occupied by the modules

**MAINTENANCE  
& REPAIR**

0.65 × 1.37 × 1.91 m ± 0.95 m

**ADD TO LAYOUT**

**MAINTENANCE  
& REPAIR**

1.51 x 1.51 x 1.91 m z 0.95 m

ADD TO LAYOUT

CONSUMPTION

### PREPARATION

MEAL PREPARATION

1.41 x 1.41 x 1.66 m z 0.83 m

**ADD TO LAYOUT**

**MEDICAL  
OPERATIONS**

0.65 × 1.24 × 1.49 m ± 0.74 m

ADD TO LAYOUT

ADD TO LAYOUT

[ADD TO LAYOUT](#)

ADD TO LAYOUT

ADD TO LAYOUT

MISSION PLANNING

1.34 × 1.34 × 1.91 m z 0.95 m

ADD TO LAYOUT

MISSION PLANNING

3.06 × 1.95 × 3.06 m z 1.53 m

**ADD TO LAYOUT**

MISSION PLANNING

1.85 × 1.85 × 2.96 m z 1.48 m

ADD TO LAYOUT

**PRIVATE  
HABITATION**

 $3.02 \times 3.02 \times 1.91 \text{ m} \pm 0.95 \text{ m}$ 

ADD TO LAYOUT

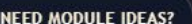
Category	Count
Habitat	~1,950
Modules	~150

☒ Critical Covered ☐ Missing

Height	Depth
--------	-------

A pie chart of how many critical functions were included in the habitat

A spider chart of how much width, depth, height dimensions are occupied



## ACCOMMODATION

HABITATION

Critical requirement: Private  
Habitation — Sleep accommodation

0.65 × 4.07 × 4.07 m z 2.03 m

ADD TO LAYOUT

Critical requirement: Safe Haven —  
Safe haven

1.69 × 2.57 × 2.48 m z 1.24 m

ADD TO LAYOUT

## PACKING FOR DISPOSAL

WASTE  
MANAGEMENT

Critical requirement: Waste  
Management — Trash Packing for  
Disposal

0.65 × 2.4 × 2.4 m z 1.2 m

ADD TO LAYOUT

## ACTIVE LAYOUT

Every change runs auto-optimize & simulate so metrics stay current.

MODULES  
23

TYPES  
8

FUNCTIONAL  
16/23 | 70%

PALETTE  
6

List of all modules added to  
habitat

ID	Type	Function	Shape	Visual
0012	GROUP SOCIALIZATION & RECREATION	TABLETOP GAMES & ARTISTIC/CREATIVE RECREATION	box	—
0017	LOGISTICS	PHYSICAL WORK SURFACE ACCESS	box	—
0018	LOGISTICS	TEMPORARY STOWAGE	box	—
0021	EVA SUPPORT	SUIT COMPONENT TESTING	box	—
0022	EVA SUPPORT	COMPUTER DISPLAY AND CONTROL INTERFACE	box	—
0029	MISSION PLANNING	COMMAND AND CONTROL INTERFACE	box	—
0030	MISSION PLANNING	PHYSICAL WORK SURFACE ACCESS	box	—
0031	MISSION PLANNING	MISSION TRAINING	box	—

Scroll to the side for  
Edit and Delete  
button to  
customize each  
module

AI agent to help  
create modules  
from descriptions



NEED MODULE IDEAS?

## GROMMIT MODULE GENERATOR

Describe what you need and Grommit will sketch  
out new modules.

ASK GROMMIT

Build a quiet sleep pod near the exercise  
zone

GENERATE MODULES

CLOSE

RE-ID MODULES





Generate layout automatically with provided parameters

Optimize by grouping and ensuring min dimensions fit within habitat

Validate against requirements and provide score

Export design and download .md file

## AUTONOMOUS LAYOUT DESIGNER

Crew Size

4

Mission Duration (days)

90

Habitat Type

Inflatable

Pressurized Volume (m<sup>3</sup>)

160

Target ISRU Ratio

0.6

Docking Ports

2

Seed

42

Mission Priorities

eg. Include life care and safe haven for emergencies.

GENERATE

OPTIMIZE

VALIDATE


SCORE

EXPORT MD

LOAD INTO DESIGNER

Generated layout. Critical coverage 100 / 100 (31/31). NHV 129.97 m<sup>3</sup>, efficiency 0.81. Validation messages: Crew size 4 within supported range.; Mission duration 90 days within supported range.; All mandatory zones present.; NHV 130.0 m<sup>3</sup> meets per-crew requirement.; NHV efficiency 0.81 meets minimum.; Radiation shielding meets requirement.; ECLSS redundancy satisfied.; Water recycling meets specification.; Power autonomy meets lunar night requirement.; Dust mitigation features verified.; Zone adjacency graph is connected.; Redundant paths present in adjacency graph.; Multiple egress-capable zones confirmed.; Storm shelter reachable within required hops.; Crew quarters privacy targets satisfied.

Explore reference layouts engineered for 2-4 crew over 30-180 days. Each concept respects NASA/CSA habitat standards, optimizes crew flow, and embeds redundancy for autonomous operations.

 REFRESH DESIGNS

### HELIOS-3 STACK HABITAT

2-4 CREW · 180 DAYS

Three-level hybrid stack with embedded storm shelter, hydroponics wall, and private crew pods.

- Dual-loop ECLSS core with storm shelter redundancy
- Hydroponics + algae bioreactor for 20% O<sub>2</sub> buffer
- Privacy-optimized crew capsules with acoustic isolation
- Exercise alcove and mindfulness dome for well-being

NHV / VOL

0.51

HAB VOL

365.01 m<sup>3</sup>

CREW CAPACITY

4

POWER USAGE

7.05 kW

MODULE FIT

12 issues

APPLY IN DESIGNER

APPLY & VIEW CROSS-SECTION

### HELIOS + HORIZON FABRICATION WING

3-4 CREW · 180 DAYS

Primary habitat plus expandable ISRU and robotics wing for fabrication-focused missions.

- Extended cylinder envelope with dedicated ISRU interface
- Robotics teleoperation bay separated from crew quarters
- Elevated feedstock loft for spare parts and expansion kits
- Maintains storm shelter and dual redundancy pathways

NHV / VOL

0.44

HAB VOL

508.44 m<sup>3</sup>

CREW CAPACITY

4

POWER USAGE

7.5 kW

MODULE FIT

11 issues

APPLY IN DESIGNER

APPLY & VIEW CROSS-SECTION

### HOW TO USE

1. Select a habitat concept to review systems, zoning, and metrics.
2. Apply the layout to open it directly in the Designer workspace.
3. Simulate to capture a snapshot or inspect the stacked cross-section.

Pre-defined solution based on “Internal Layout Assessment of a Lunar Surface Habitat” by ASCEND